CONF-750822--6

DRAFT

STATUS OF ANSI STANDARDS ON DECOMMISSIONING OF NUCLEAR REPROCESSING FACILITIES

H. B. Graham

Oak Ridge National Laboratory*

To be presented at the Conference on Decontamination and Decommissioning of ERDA Facilities, Idaho Falls, Idaho, August 18-21, 1975

*Operated by the Union Carbide Corporation for the Energy Research and Development Administration.

Status of ANSI Standards on Decommissioning of Nuclear Reprocessing Facilities

H. B. Graham
Oak Ridge National Laboratory*

Preparation of the American National Standard "Design Objectives for Decommissioning of Nuclear Reprocessing Facilities" was ~~industries'~~ attempt at interpreting 10CFR, Part 50, Appendix F for the designer of nuclear reprocessing facilities. Appendix F states in part that "a design objective for reprocessing plants shall be to facilitate decontamination and removal of all significant radioactive waste at the time the facility is permanently decommissioned." This is what the subcommittee has attempted to do.

The first problem was the definition for decommissioning. Defining "decommissioning" as used in this standard was a difficult problem. Each member of the subcommittee had a different idea of decommissioning. A definition of decommissioning evolved as "the planned and orderly execution of a program taken by a nuclear facility licensed to achieve a substantial and permanent improvement in the status of a shutdown facility which includes: (1) decontamination of the structure and equipment; (2) removal of sources of radioactivity; (3) return of the site to such a condition that it may be safely returned to unrestricted surface use; (4) maintenance under the minimum surveillance required for the protection of public health and safety for a specified time where it is shown to be technically and/or economically infeasible to decontaminate to levels

---

*Operated by the Union Carbide Corporation for the Energy Research and Development Administration.

acceptable for unrestricted use."

The area of minimum surveillance created more discussion than anything else. The first thing that comes to mind of the licensee is abandonment of the facility. Let someone else maintain surveillance of this facility in perpetuity. Corporate entities have a finite ~~life.~~ Only governmental agencies survive the ages. Most of the privately owned nuclear reprocessing facilities have a provision in their state charter which allows the licensee to transfer title to the property to their respective state body for continued surveillance and monitoring of the site boundaries.

Does the final ownership of the property effect the design? It really does not. The protection of the public health and safety is the prime consideration in all cases. Achievement of this objective is the ultimate design, regardless of ownership.

The state of the art under present technology is entombment for much of the facility--a monument for posterity. There are all kinds of ramifications to that statement, none particularly acceptable. The degree to which a facility would be completely dismantled would depend on a cost-risk-benefit analysis, where the cost/risk is the cost in dollars plus the expense to personnel in carrying out the decontamination activities, and the benefit is the reduction of the risk to the general public and residual radioactivity in the facility.

During the design phase of the plant project, the levels of radiological contamination expected to be present at the time of decommissioning shall be evaluated, and the general procedures and equipment to be used to decontaminate the affected area shall be identified. The proposed methods of disposal of contaminated and irradiated material shall be identified. Special design features necessary to permit the proposed decontamination to be carried out safely are to be incorporated in the facility at the

time of construction.

Prior to decommissioning, detailed studies shall be made to identify the locations, types, quantities, and associated hazards of radioactive materials and reactive chemicals which are or may be present in the facility. To the extent practicable, the locations, types, quantities, and associated hazards of radioactive materials and reactive chemicals remaining after decontamination shall be identified and documented.

Where the owner has deactivated or shutdown one process facility but continues to operate on the same site or builds another operating plant on the same site, this deactivation of the facility, even if it involves abandonment in place, is not decommissioning in the context of this standard. Deactivation can be partial or can involve complete shutdown of the process operation. Even where total plant shutdown is part of deactivation, the plant owner has complete control of the functions or activites remaining on site and retains the complete responsibility for surveillance of the deactivated facility to assure public health and safety. Generally, where a process or plant facility becomes either technologically obsolete or deteriorated to such a degree that renovation is economically infeasible, the owner will build another facility encompassing advanced technology within the same site boundaries. There are several reasons for such a decision: (1) the site has already obtained the necessary approvals for this similar work; (2) the environmental statement would require less effort during preparation; (3) utilities, roads, manpower, waste discharge, and all the other support facilities are already present; and (4) community acceptance of the plant operation is present. It is not necessary to prove your value to the community. Many of the problems existing during the original PSAR and FSAR presentations have resolved themselves. Since the plant is a going concern, the hectic days of the original construction are replaced by a more orderly

organization during the new construction and operation. This is not to say that all headaches are resolved. If not eliminated, they are at least reduced to a more manageable proposition.

The first task undertaken by this subcommittee was the preparation of an ANSI Standard, "General Design Criteria for Nuclear Reprocessing Facilities" - N101.3 - 1972, which included a section on decommissioning. This section contained only the basic broad requirements for decommissioning. Time will not permit a discussion of all the dryruns and obstacles encountered by the subcommittee in their deliberations. ~~Preparation of~~ a standard for a subject that has never been tackled, and a sensitive subject at that, all kinds of problems appear. ~~The~~ simple thing as the title required hours of discussion and ~~actually~~ ~~changing~~ three ~~times~~ before ~~the present title~~ was ~~agreed to~~. Actually, it was the same title that we started with in the very beginning. The U. S. Nuclear Regulatory Commission, formerly U.S. Atomic Energy Commission-Regulatory Branch, provided guidance for much of the standard. They were in the process of preparing 10CFR, Part 50, Appendix Q covering the same subject. Many of their recommendations are included. Their regulation was issued a year after our standard ~~was~~ available for public use. Incidently, NCR failed to endorse the standard because their Appendix Q had the force of law and our standard, like any ANSI Standard, is used on a voluntary basis. Our subcommittee members were perturbed to say the least. They had worked hard and spent their time and their company's money preparing this standard. They deserved recognition for their efforts.

The present standard may have the same fate. NCR will be preparing another Appendix to Part 50 after results from their contract with PNL are obtained. This study was consummated to provide NCR with a cost-benefit-risk analysis resulting from decommissioning of a nuclear reprocessing facility. This information is unavailable but vitally important to them before attempting

to formulate national policy. The subcommittee feels that, with present technology, abandonment with entombment of the highly radioactive parts of the plant ~~are~~ the only economically feasible alternatives to decommissioning of nuclear fuel reprocessing facilities. This study will put a dollar figure on each step involved with decommissioning. This will include returning the site to its original condition on one end of the spectrum to a minimal decontamination and entombment of certain equipment and facilities with periodic surveillance held to a minimum on the other.

All potentially hazardous facilities would be made ~~inexcessible~~ inaccessible to ~~all~~ casual visitors. This would not prevent deliberate action on someone's part to gain access to these emtombed facilities. It would be the intent of the designer to design a facility by which the complete facility could be decontaminated to de minimus levels. De minimus level is defined as that level of contamination acceptable for unrestricted use or release. In this case, release means to the general public.

In the preparation of this standard, a review of a 1971 report by Eurochemic, entitled "The Shutdown of Reprocessing Facilities - Results of Preliminary Studies on the Installations Belonging to Eurochemic," was made to provide the subcommittee with possible pertinent information from an independent study. Their report concluded that the extent to which complete dismantling is required depends on the local conditions and on the nature of the activities foreseen for the ultimate use of the site. In their case, these considerations led to a proposal for the total dismantling of the Eurochemic Facilities and for sending the solid waste offsite for their final disposition.

The study was primarily concerned with the definition of the state in which the Eurochemic facilities might be abandoned without posing problems either for the safety of the environment or for carryout, on the same site, of possible future industrial activities of a non-nuclear character.

In addition, the study included decontamination and the dismantling of the installations, the treatment of the resulting residues, and the transportation of these solid wastes to some permanent disposal site.

The study concluded that dismantlement of a facility ~~to~~ the type of Eurochemic, which handles large quantities of irradiated fuel elements in solution, is technically possible. Nonetheless, we are speaking of a difficult undertaking, full of risks, which necessitates putting to work large efforts whose financial magnitude should not be underestimated.

It was this last statement that the industrial members on the subcommittee could see more vividly. When you mention risks and financial objectives of untold magnitude, they retrench to the most conservative position. In this study they were talking about a force of 40-50 people working 3-4 years dismantling the Eurochemic facilities. The facilities in the U.S. have a larger capacity, shorter-cooled material and higher-burnup fuels to reprocess. The thesis that a nuclear fuel reprocessing facility should be designed so that it could be completely dismantled some 40 years in the future, was entirely unacceptable. It was not practical. With the high-level concentration of radioactivity and contamination in certain parts of the facility, decontamination and removal of all activity would be most difficult. Some place in between the two extremes is the industries' position. After ERDA's study by PNL is completed, a better position can be taken on the subject.